PIVOT ASSEMBLY

TECHNICAL FIELD

[0001] This invention relates to a sleeve bearing pivot assembly between a pair of spaced walls which holds the walls in spaced relation to one another while permitting relative pivotal movement.

BACKGROUND OF THE INVENTION

[0002] Sleeve bearings are the preferred bearing for many applications because of their reasonable cost, ease of installation, long life and load carrying capability. Light weight structures which have thin parallel load bearing walls and which need to be pivotally connected to one another on an axis transverse to the walls, present a design problem in that deflection of the walls under the load carried by the pivot joint will unevenly load a typical sleeve bearing.

BRIEF SUMMARY OF THE INVENTION

[0003] The present invention provides a pivot assembly interconnecting a pair of spaced parallel thin walls which uses a sleeve bearing whose bearing surfaces are evenly loaded even though the walls deflect under the load carried by the bearing. A component of the sleeve bearing is mounted in such a manner that it changes it orientation relative to a wall when either of the walls deflect under load.

BRIEF DESCRIPTION OF THE DRAWINGS

[0004] One embodiment of the invention is shown in the drawings, in which:

Figure 1A is a side view of a stairway which may be raised and lowered;

Figure 1B is a side view showing the stairway in a lowered position;

Figure 2 is a section taken along the line II-II in Figure 1;

Figure 3 is top view of the step shown in Figure 2;

Figure 4 is an enlarged view of a pivot assembly;

Figure 5 is a section on the line V-V in Figure 4 and

Figure 6 is an exploded view of the pivot assembly.

DETAILED DESCRIPTION OF THE INVENTION

[0005] Referring to Figures 1A – 3, the illustrated stairway 11 includes a stationary base 12 with a pair of laterally spaced parallel support posts 13, 14 rigidly secured to the base 12. A pair of parallel walls or stair joists 16, 17 have corresponding ends pivotally connected to the base 12 on a transverse horizontal axis by coaxial pivot pins 18, only one of which is shown. The opposite corresponding ends of the stair joists 16, 17 are pivotally connected to a pair slanting uprights 21, 22 by a pair of coaxial pivot pins 19, only one of which is illustrated, for pivotal movement about a transverse horizontal axis. A step module 23 has it laterally opposite ends rigidly secured, respectively, to the lower ends of the uprights 21, 22. The stair joists 16, 17 are fabricated from relatively thin flat sheets of metal and are reinforced by a cross bracing structure 24.

[0006] A pair of upper links 26, 27 are pivotally connected at their opposite ends to upper ends of the posts 13, 14 and to the upper ends of the uprights 21, 22 by suitable pins 28, 29. A pair of intermediate links 31, 32, serving as hand rails, are pivotally connected at their opposite ends to the posts 13, 14 and to the uprights 21, 22 by transverse pivot pins 33, 34. The support posts 13, 14 and the base 12 provide a stationary support for the stair joists 16, 17. The axes of the pins 18, 28 and 33, lie in a first plane. The axes of the pins 19, 29 and 34 lie in a second plane parallel to the first plane. The spacing of the pins is such as to create a parallel linkage which allows the step 23 and the uprights 21, 22 to be raised and lowered. The lowered position is shown in Figure 1B.

[0007] A pair of step modules 41, 42 are pivotally connected to the stair joists 16, 17 by pivot assemblies 43. As shown in Figures 2 and 3, the step module 41 has thin flat vertical side walls or plates 46, 47 to which a tread 48 is welded. Step module 42 is of the same general construction. A pair of link rods 49, 51 are pivotally connected by pins 52, 53 to the side plates 46, 47 of the steps modules 41, 42 and have corresponding ends pivotally connected to the base 12 by pins 56 so that when the step module 23 is raised or lowered, the treads of the step modules 41, 42 will remain horizontal as they raised or lowered.

[0008] Referring to Figures 4-6, the pivot assembly 43 includes a stepped diameter pivot rod or cylindrical stud 61 which has a large exterior diameter part 62 and a small exterior diameter part 63 separated by a shoulder presenting a flat annular axially facing abutment surface 64. The cylindrical stud 61 had a hollow interior defined by a bore 66 which has a coaxial relationship with the cylindrical exterior surfaces of the large and small diameter portions 62, 63. The stud 61 is secured to the joist 16 by a tension member in the form of a round headed bolt 67 having square section portion 68 adjacent its head 69 which nonrotatably mates with a square hole 71 in the joist 16 and a nut 72 on the threaded end 73 of the bolt applying axial thrust against the reduced diameter end of the stud 61 through a washer 74.

[0009] The side plate 46 of the step module 41 has an annular opening or bore 76 into which a radially outer sleeve 77 of a sleeve bearing module 78 is pressed. A radially inner sleeve 81 has a radially inward facing cylindrical bearing surface 82 in radial thrust bearing engagement with a radially outward facing cylindrical bearing surface 83 of the reduced diameter portion 63 of the stud 61.

[0010] The sleeves 77, 81 have complimentary spherical load bearing surfaces 91, 92 which are textured in such a way that relative movement about axes at right angles to the axis 86 of

sleeve bearing surfaces 82, 83 is permitted but relative rotation of the sleeves 71, 81 about axis 86 is prevented The inner sleeve 81 is made of a plastic or synthetic composition known for its suitability for use in self lubricated or nonlubricated bearings. The illustrated two piece sleeve bearing is currently marketed as a SPYRAFLO bearing. The mating spherical surfaces 91, 92 allows relative movement between the inner sleeve 81 and its support sleeve 77 to compensate for deflection of the walls 16, 47, thereby insuring even loading of the cylindrical bearing surfaces 82, 83.